Ph.D Research Outline

Submitted To:

Symbiosis International University
Symbiosis Knowledge Village
Lavale
Pune – 411042

Under the guidance of:

Dr. Arun Mudbidri

Submitted By:

Deepak Roy

Ph.D ID No. 100354

Symbiosis International University

Research Topic

"Impact of Intellectual Property on Company Performance in the Information Technology Industry in India"

Rationale and Significance of the Study

Indian businesses are globally known for their soft technology prowess, popularly known as "soft power". There is ample evidence of this, whether in information technology, bio-technology or the pharmaceutical sector. The 21st century will be primarily a knowledge economy and the main drivers of any business will be innovativeness and how intellectual property is created, commercialized and protected by law of the land. Intellectual Property (IP) will play a crucial role in creating businesses that can compete globally with world-class products and services (WIPO). Silicon Valley in California, USA is a perfect example of how substantial wealth can be created by innovative start-up information technology companies, by successfully commercializing intellectual property, primarily in the form of patents. The close interaction between academics, industry and venture funding has mainly contributed to this success.

World Intellectual Property Organization (WIPO), a specialized agency of the United Nations Organization, defines Intellectual Property (IP) as creations of the mind, which include inventions, literary and artistic works and symbols, names, images, and designs used in commerce. IP can be regarded as more tangible part of company's knowledge, as IP consists of patents, copyrights, trademarks, designs, etc. that can be more easily valuated than more intangible intellectual assets. . However, with a knowledge-centric

view trade secrets or know-how, citations, publications, etc. could be other components of IP definition (Bollen et all., 2005, Nelson, 2009, Akiyama and Furukawa, 2009). Intellectual property Laws (IPR) laws in India define IPR as a monopoly right exclusively designed in law to own, possess, produce, reproduce, sell or license

It is often argued that Companies in today's new economy do not primarily invest in fixed assets, but in intangibles, since these are today's value drivers (Daum 2001). Intellectual capital and intellectual property is an important source of an organization's economic wealth and therefore needs serious consideration when formulating a firm's strategy. Richard Thoman, CEO of $20 billion Xerox Corporation, when asked about his priorities in Xerox, he mentioned "My focus is Intellectual property. I am convinced that management of intellectual Property is how value added is going to be created at Xerox. Increasingly companies that are good at managing IP will win. The ones that aren't will loose." (HBR Jan 2000). IP-savvy business leaders believe that in the new business world, companies are competing not for control of markets or raw materials but for the rights to new ideas and innovation.

The author would like to study the information technology sector, as he has two decades of experience in this industry, and also for the fact that the IT industry, because of its success, is recognized as global brand ambassador for India. The IT sector in India consists of knowledge intensive companies which primarily provide software solution services globally. As per NASSCOM 2010 report, over the past decade, the Indian IT-BPO sector has become the country's premier growth engine, crossing significant milestones in terms of revenue growth, employment generation and value creation. This industry aggregated revenues of USD 73.1 billion in FY2010, with the IT software and services industry accounting for USD 63.7 billion of revenues. During this period, there

was direct employment of nearly 2.3 million. As a proportion of national GDP, the IT sector revenues have grown from 1.2 % in FY1998 to an estimated 6.1 % in FY2010**.** Export revenues grew to around USD 50.1 billion in FY2010.

One of the key concerns among companies in the IT sector is the pressure on billing margins and profitability. Companies can no longer expect to maintain high billing margins if they continue to provide low-end sweat-shop kind of solutions. Innovative companies need to move up the "value chain" in providing high-end customized solutions for their clients across the globe. It is in this context, that management of intellectual property becomes a strategic tool to be looked into by IT companies to enhance their profitability and competitiveness. There are literatures on product patents and their contribution to market performance in the pharmaceutical and other manufacturing industries. The service industry has largely been unexplored, mainly because of the difficulties in valuating and quantifying intellectual property and their contributions. The author would like to explore this further in his research study. The author in literature reviews so far, has not come across any research study on the contribution of intellectual property towards performance of IT companies in India.

Aim and Objective of the study

The research will examine the following objectives in the Indian context:

(a) Whether a correlation exists between Intellectual Property (IP) and IT company performance in the IT industry

(b) Study IP valuation models/techniques in various industries and suggest an optimum IP valuation model for IT industry

(c) Examine the contribution of IP towards profitability, business growth and competitiveness in the Indian context

(d) Whether Intellectual Property Rights (IPR) Laws in India, facilitate or hinder the creation, commercialization, protection and enforcement of Intellectual property

(e) Examine the IPR awareness and IP-centric strategies of the IT companies during the timeframe of the study

Pilot Study

A pilot study has been conducted by the author to do the preliminary testing of the hypotheses, which will eventually lead to more precise hypotheses in the main study. This study will also help the author with better clarity on the research objectives, defining the construct variables, the type of data to be collected, the questionnaire design for primary data and the statistical and analytical procedures to be adopted. The pilot study has been done with twenty IT companies in the city of Pune. Pune has emerged as a major IT hub in the country. Most of the large and mid size IT companies are located in Pune and therefore it represents a pan-Indian microcosm of the IT industry. Selection criteria has been that each of these twenty companies should own at least one patent, among other intellectual property. Studies have shown that patent royalty earnings, R&D expenses towards patents, and its contribution to new product/service revenue, are the most quantifiable among all other types of intellectual property. The pilot sample size of twenty companies comprises of large and medium size IT companies to reflect a better representation to the study.

List of IT companies chosen for the pilot study in Pune:

1. Infosys Technologies Ltd.
2. WIPRO Ltd.
3. Tata Consultancy Services
4. IBM
5. Siemens PLM Software
6. Tech Mahindra Ltd.
7. KPIT Cummins Infosystems
8. Mind Tree Ltd.
9. Hewlett-Packard Ltd.
10. Symantec Corporation
11. Symphony Services
12. Mphasis Ltd.
13. SAS
14. Sybase Software India
15. Amdocs Ltd.
16. Persistent Systems
17. Sasken Communications Technology
18. Dassault Systems
19. Fiserv India
20. Geometric Ltd.

Pilot Study – Research Methodology

Nine construct variables were identified in this study, in consultation with industry experts**. These are IP impact on profitability, IP impact on turnover, IP impact on market share, R&D/Patent spend, IP impact on service value chain, royalty from patents, IP impact on client billing margins, business model link with patent and IPR infringement laws in India.** A questionnaire **(Appendix- A)** was designed to get responses to the above constructs on a 5-point scale (1 – Very Low to 5 – very high). The questionnaire was administered, through e-mail/telephone interview, to each senior executive of the twenty IT companies, who are responsible for IP management. Based on the response to the nine variables, company ranking of 1 to 20 was done by summation of all the index counts of the variables. Price-to-Book ratio (secondary data) was chosen in this study as one of the key measures of company performance. The

price-to-book ratio, or P/B ratio, is a financial ratio used to compare a company's book value to its current market price. Book value is an accounting term denoting the portion of the company held by the shareholders; in other words, the company's total tangible assets less its total liabilities. P/B ratio signifies the intangible assets like goodwill, brand equity, IPRs, etc. where the market puts a premium on the company, over and above the book value. P/B ratio is also useful for valuation of a company in mergers & acquisitions.

P/B Ratio data was obtained from audited/reported financial statements of the company. Ranking of these sample companies were done based on the P/B Ratios. The Spearman's Rho rank-order correlation was used to test the direction and the strength of the relationships between the two measures, IP index ranking and P/B ratio ranking.

The pilot study also examined (1) the correlation between R&D spend and IP impact on profitability and (2) the correlation between IPR infringement laws and IP impact on turnover of a company. Various statistical tools like Spearman's rank coefficient, p-value & t-statistic value were used to examine the statistical significance. The findings of the study are explained in the following pages.

Pilot Study - Research Findings

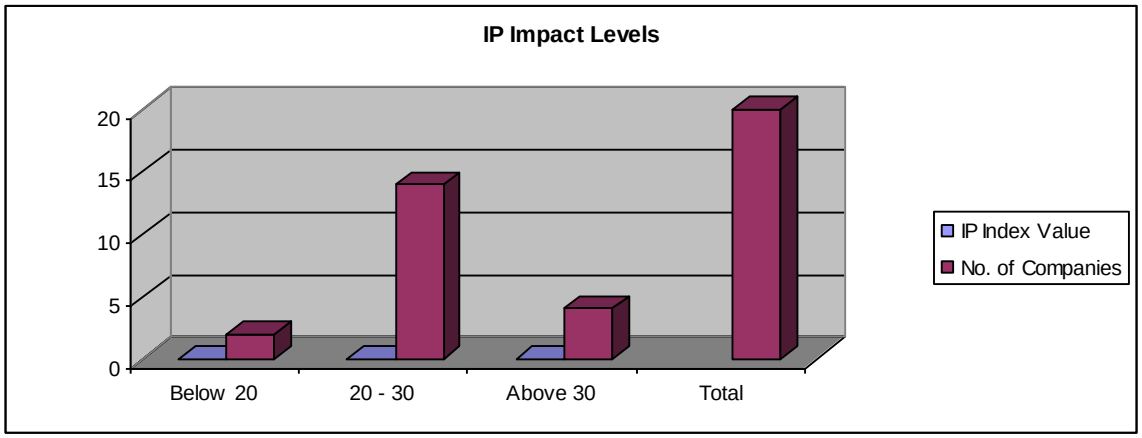
IP impact index count of the response from the twenty companies (primary data) is shown in **Exhibit 1 & 2**. The result shows that 2 out of the 20 companies (10%) is ranked low (below 20 IP index count), 14 out of 20 companies (70%) is ranked moderate (20-30 index count) and 4 out of 20 companies (20%) show high ranking (above 30 index count).

Exhibit 1

Table Ranks for IP Impact levels for IT Companies

IP Index Count	IP Index Value	Index Rank	No. of Companies
Below 20	Low	3	2
20 - 30	Moderate	2	14
Above 30	High	1	4
Total			**20**

Exhibit 2



Statistical Inference 1:

Spearman's Rank Correlation coefficient (Spearman's Rho)

Formula:

$$(R) = 1 - \frac{6\sum d^2}{n^3 - n}$$

Where d = difference between IP impact on profitability and R&D/Patent spend.

The author wanted to check the strength of the relationship between R&D spend and IP impact on profitability. Ranking was done on a 1 to 5 scale, based on the response from

the pilot study. The Spearman's Rho (R) = 1 – {(6 X 100.5) / 7980} = 0.93, suggests that there is very strong and significant positive correlation between R&D spend and IP impact on profitability.

The p-value is significantly lower than 0.05, therefore the null-hypothesis that there is no correlation between the variables can be rejected. There is 95% probability that the observation on the data is not due to chance. The t-statistic value is 6.14, which is higher than the t-table value, further confirming that the null hypothesis can be rejected.

This data is shown in Exhibit 3

Exhibit 3

Company name	IP/Profitability Rank	R&D spend Rank	d	d squared
Infosys Technologies Ltd.	4.5	2.5	2	4
WIPRO Ltd.	4.5	2.5	2	4
Tata Consultancy Services	3.5	4.5	-1	1
IBM*	3.5	1	2.5	6.25
Siemens PLM Software *	3.5	4.5	-1	1
Tech Mahindra Ltd.	8	2.5	5.5	30.25
KPIT Cummins Infosystems	6.5	4.5	2	4
Mind Tree Ltd.	3.5	2.5	1	1
HP Ltd.*	6.5	4.5	2	4
Symantec Corporation*	3.5	4.5	-1	1
Symphony Services	4.5	2.5	2	4
Mphasis Ltd.	4.5	4.5	0	0
SAS*	1.5	4.5	-3	9
Sybase Software India	6.5	4.5	2	4
Amdocs Ltd.*	3.5	2.5	1	1
Persistent Systems Ltd.	3.5	2.5	1	1
Sasken Communications Tech.*	4.5	2.5	2	4
Dassault Systems*	6.5	2.5	4	16
Fiserv India	1.5	2.5	-1	1
Geometric Ltd.	4.5	2.5	2	4
				100.5

Statistical inference 2:

Correlation between IPR infringement laws and IP impact on turnover was examined by calculating the Spearman's Rank coefficient. Using the Spearman's Rho formula, we get

(R) = 1 – {(6 X 212) / 7980} = 1 – (1272 / 7980) = 0.85

The Spearman's Rho (R) being 0.85, suggests that there is very strong and significant positive correlation between IPR infringement laws and IP impact on turnover.

P-value is considerably lower than 0.05 and t-statistic value is 3.99, which is more than t-table value, thus we can conclude that the null hypothesis can be rejected.

Data is shown in Exhibit 4

Exhibit 4

Company name	IP Impact on Turnover ranking	IPR Infringemnet Laws ranking	Spearman's Rho d	D squared
Infosys Technologies Ltd.	5.5	1.5	4	16
WIPRO Ltd.	7.5	3.5	4	16
Tata Consultancy Services	7.5	5.5	2	4
IBM*	5.5	3.5	2	4
Siemens PLM Software *	1.5	3.5	-2	4
Tech Mahindra Ltd.	9.5	5.5	4	16
KPIT Cummins Infosystems	5.5	3.5	2	4
Mind Tree Ltd.	5.5	3.5	2	4
HP Ltd.*	5.5	7.5	-2	4
Symantec Corporation*	7.5	7.5	0	0
Symphony Services	5.5	1.5	4	16
Mphasis Ltd.	7.5	3.5	4	16
SAS*	1.5	3.5	-2	4
Sybase Software India	7.5	7.5	0	0
Amdocs Ltd.*	3.5	3.5	0	0
Persistent Systems Ltd.	5.5	1.5	4	16
Sasken Communications	9.5	7.5	2	4
Dassault Systems*	9.5	7.5	2	4
Fiserv India	3.5	7.5	-4	16
Geometric Ltd.	9.5	1.5	8	64
				212

Finally relationship between the overall IP index ranking and Price-to-Book value (secondary data from the financial market) ranking was examined using the Spearman's Rho.

Spearman's Rho

$$(R) = 1 - \frac{6\sum d^2}{n^3 - n}$$

Where d = difference in rankings between PB ranking and IP ranking.

n = number of companies being ranked

Therefore (R) = 1 – {(6 X 435) / 5814} = 1 – (2610 / 5814) = 1 - 0.44 = 0.56

Even with a small sample size (18 companies), shown **in Exhibit 5,** the relationship between IP index ranking and P/B ratio ranking is moderately high as Spearman's Rho calculated is 0.56. This suggests that there is a positive correlation between the two measures. It is expected that with a larger sample size, Spearman's Rho will be higher, thus signifying a better statistical fit.

P-value is 0.04, which is smaller than 0.05, therefore the null-hypothesis that there is no correlation between the variables can be rejected. The t-statistic value is 2.20, which is more than the t-table value, therefore the null hypothesis that there is no correlation between the variables can be rejected.

Data is shown in Exhibit 5

Exhibit 5

	Company name	IP Index Rank	P/B Ratio Ranking	Spearman's Rho d	Spearman's Rho d squared
1	Infosys Technologies Ltd.	7.5	5	2.5	6.25
2	WIPRO Ltd.	11.5	6	4.5	20.25
3	Tata Consultancy Services	9.5	1	8.5	72.5
4	IBM*	3.5	3	0.5	0.25
5	Siemens PLM Software *	2	4	-2	4
6	Tech Mahindra Ltd.	18	14	4	16
7	KPIT Cummins Infosystems	13	11	2	4
8	Mind Tree Ltd.	5.5	15	-9.5	90.5
9	HP Ltd.*	14.5	17	-2.5	6.25
10	Symentec Corporation*	11.5	10	1.5	2.25
11	Symphony Services	5.5	2	3.5	12.25
12	Mphasis Ltd.	11.5	9	2.5	6.25
13	SAS*	1	8	-7	49
14	Persistent Systems Ltd.	7.5	16	-8.5	72.5
15	Sasken Communications Tech.*	16.5	20	-3.5	12.25
16	Dassault Systems*	18	12	6	36
17	Fiserv India	9.5	13	3.5	12.25
18	Geometric Ltd.	14.5	18	-3.5	12.25
					435

IP Valuation Models

From the literature review done by the author so far, two valuation models have been identified and examined for benchmarking IP and company performance.

1**. Tobin's Q model**: Created by James Tobin, Nobel Laureate in Economics.

Tobin's Q looks at the ratio between a firm's market value and the replacement costs of all the firm's assets. For example a Tobin's Q of 2 means that the firm's market value is

twice as large as the replacement costs of its assets. However finding and determining the replacement costs for all assets is time consuming and unfeasible.

2. Calculated Intangible Value (CIV)

Developed by the NCI research group, it is an easier and accurate measure of intangible asset valuation. CIV is a measure of company's ability to use its intangible assets to outperform the other companies in the industry. CIV is calculated by finding the firm's current three-year average pre-tax earnings, then subtracting from it, the product of three-year industry average Return on Assets (ROA) & firm's three-year average tangible assets.

Conclusion

The findings of the pilot study have been positive and statistically significant.

There is a strong correlation between R&D spend IP impact on profitability. The study also shows a strong correlation between IPR infringement laws and IP impact on company turnover. Furthermore it was established that there is a correlation between Profit-to-Book Ratio and IP index rankings. P/ ratio signify intangible assts like patents, goodwill, brand equity, etc.

The pilot study addresses the research objectives with the preliminary testing of the hypothesis and gives clarity and direction to the main study. The main research study will involve a larger sample size of IT companies and analysis will be done with appropriate IP valuation model.

Appendix - A

Research Questionnaire – Pilot Study

1. Tell us briefly about your patent number, description, claims, etc., when it was acquired and who are the inventors and in how many companies have these been filed

2. How much have you spent in acquiring this patent? (R&D/development cost/patent filing legal cost, etc.)

1 2 3 4 5

3. Have you commercialized or used your patent in providing customer solutions?

1 2 3 4 5

4. What were the extent of challenges in commercializing your patent?

1 2 3 4 5

5. To what extent has your business model evolved around your patent?

1 2 3 4 5

6. How is your business model linked with your patent?

1 2 3 4 5

7. Besides patents, what other type of IP portfolio does your company possess? (Copyrights, Trademarks, designs, trade secrets, etc.)

8. Do you show intangible assets in your balance sheet?

9. How have you done your valuation of your IP assets? How?

10. How much has your company benefited from commercializing your patent/IPR?

1 2 3 4 5

11. To what extent have you leveraged your IP assets?

1 2 3 4 5

12. What percentage of your company revenues are from IP related activities?

1 2 3 4 5

13. What percentage of royalty does your company earn from patents?

1	2	3	4	5

14. Is there an increase in your turnover because of patent use and what is the percentage increase?

1	2	3	4	5

15. Has there been an increase in your market share because of patents and by how much?

1	2	3	4	5

16. Has there been an improvement in your services value chain as a result of IP?

1	2	3	4	5

17. Have your client billing margins improved because of your IP assets?

1	2	3	4	5

18. Has there been an impact on company profitability due to your IP assets? How much?

1	2	3	4	5

19. Have there been any infringements in your IPRs? Can you give details.

1	2	3	4	5

20. Is there an IPR strategy in place in your company? What strategy is used?

1	2	3	4	5

21. How has IPR assets helped your company in getting funded?

1	2	3	4	5

22. How adequate are IPR infringement laws in India? Do you suggest some changes?

1	2	3	4	5

23. How adequate are IPR protection regime in India? Any suggestions for improvements?

1	2	3	4	5

Grading Scale: 1. Very Low; 2. Low; 3. Average; 4.High; 5.Very High

Literature Review

Laury Bollen, Philip Vegauwen & Stephanie Schienders explored in their paper to link empirically the value of intellectual capital and intellectual property to firm performance. This study was directed towards the German pharmaceutical industry. The limitation is that it may not be applicable in the Indian context. The results of the study show that including intellectual property in models linking intellectual capital to firm performance enhances the statistical validity of such models and their relevance for management. To test the robustness of the findings for other industries and other countries, additional research is necessary.

Mark Rogers in his paper analyses the relationship between innovation - R&D, patent and trade mark activity and profitability in a panel of Australian firms (1995 to1998). His findings show that industries which have very high participation in R&D reflect high mean profitability. A possible explanation is that these industries are ‘competitive’ in the sense that incumbent firms have few long run sustainable advantages, but that R&D is valued because it can create profitability differences and entry barriers. It established methodology of assessing competitive conditions, which utilizes a profit persistence type framework. It does not provide an unambiguous classification of competitive conditions. Further research needs to be done due to the complex nature of competition within industries, and the range of factors that can cause sustainable advantages.

Pavel Gurishev examines the effect of IPR on developing economies and whether tighter IPR protection leads to increase in industry productivity. He opines that FDI inflows provided necessary improvements to industrial production in India. IPR protection

separately does not positively contribute to economic growth. The use of VAR model in the research was overly simplified, resulting in loose correlation between IPR & productivity. There is a need to shift the research objectives from overall economic growth to more specific areas like employment, rate of innovation & income inequality.

Enrico Santarelli & Francesca Lotti in their paper examine whether patent-based indicators are still reliable measures of innovativeness in light of organizational changes in the field IPR protection and the regulatory reforms at the US Patent and Trademark Office (USPTO) and the European Patent Office (EPO). The findings of the study provide some indication of a statistically significant relationship between patents and productivity growth and, in particular, profitability. The only limitation is that the small number of observations prevent the researchers to conduct more sophisticated, and perhaps more suitable econometric techniques. Future research should examine (i) the relationship between R&D expenditure and patenting, either with EPO or USPTO, and (ii) the simultaneous impact of both R&D and patenting on productivity growth and profitability performance.

Bernard Marr, Gianni Schiuma & Andy Neely in their paper explores a knowledge-based view of the firm and discusses the importance of measuring organizational knowledge assets. They opine that long-term competitive advantage can only be gained from the management of the knowledge assets underlying organizational capabilities. This paper introduces the Knowledge Asset Map and Knowledge Asset Dashboard in order to provide organizations with a comprehensive tool that can help them to identify their key knowledge assets.

Birgitte Andersen in her paper discusses the relationship between IPR and

business methods and computer implemented inventions on the one hand, and the social and economic effects of such. The author in the paper advocates how policy must use IPR legislation very cautiously in the new economy of increasing returns to scale and adaptation. It further adds that the existing socio-legal or economic literature on IPRs has largely ignored the dynamic effects (economic or social) of the exploitation of IPRs on the general profile of corporate power, or the accountability of that power.

William E. Griffiths, Paul H. Jensen and Elizabeth Webster in their research paper develop a model of the effects of intangible capital, including, but not limiting to, innovation capital, on firm profits, using new measures for the former. Research findings indicate that profits vary, according to the type of IP rights held by the firm, the age of the firm, the size of the firm, and the lifespan of the IPR. One limitation of this study is that it is unable to analyze the profitability of investments into innovation-related activities since data on the costs of these investments were not available.

Kenneth G. Huang in his study addresses how uncertain intellectual property right (IPR) conditions impact knowledge production and accumulation in different types of innovative firms and organizations. He opines that reduction in patent enforcement uncertainty and market value uncertainty of the patent negatively impacts (by over 20%) the follow-on production and accumulation of scientific knowledge within the innovative firm. His reasoning, which he infers from his findings is that decision-makers constantly face a dynamic trade-off between exploiting these knowledge projects for short-term gains at the period immediately after patent grant versus allowing these potentially higher risk scientific projects to continue and accumulate knowledge.

Nicholas Bloom, John Van Reenen in their paper Analyzes 200 major British firms since 1968. The study shows that patents have an economically and statistically significant impact on firm-level productivity and market value. The study concludes, that market that while patenting feeds into market values immediately it appears to have a slower effect on productivity. Secondly, that higher market uncertainty reduces the impact of new patents on productivity. On limitation in this study is that there are many problems with only using one year of data to match in the corporate structure. This study was done only for UK based firms.

Elad Harison discuses in his paper the economic nature of software and computational processes and how they should be properly represented as commodities by focusing on software IPR legislation in the US. He opines that a coherent legal framework is necessary to address the factors of potential market failures and to prevent lack of R&D investments, which may result from reproduction of software elements by competitors. It is difficult to represent and interpret software products and technologies, adequately, by applying common economic wisdom.

Christine Greenhalgh and Mark Longland in their paper examine how R&D and intellectual property (IP), via patents and trade marks, increase firm productivity. The opine that long term productivity rankings of firms depend on their maintaining positive rates of R&D and acquisition of intangible assets. The paper also assumes that there is no absolute advantage to knowledge-based assets, which would provide evidence of their reliability within firms. They conclude that in all the dimensions of IP and R&D, it seems that firms have to run to stand still and they have to run faster to grow their business.

Elias Dinopoulos and Constantina Kottaridi opine in their paper that harmonization based on stronger Southern intellectual property rights protection accelerates the long-run global rates of innovation and growth and reduces the North–South wage gap. Only industries with expired patents provide useful knowledge spillovers that enhance the discovery of new higher-quality products. This improves the global wage–income distribution and accelerates long-run growth. Feasibility considerations do not permit researchers to analyze the model's transitional dynamics. The presence of unexplored transitional dynamics renders the welfare analysis of patent policies intractable as well.

Michael Abramowicz & John Duffy opine in their paper that intellectual property (IP) protects investments in the production of information and information about the market success of goods and services. A company entering first in the market, often cannot prevent other firms from capitalizing on information about consumer demand and market feasibility. Though there are some first-mover advantages, the incentives to be the first entrant into a market may sometimes be low. Therefore the net first-mover advantage may turn out to be a disadvantage and discourage innovation. IP may address this inefficiency by providing market exclusivity, thus promoting earlier market entry and increasing the level of entrepreneurial activity in the economy.

Rajesh Pillania (2008) in his research paper emphasizes that acceptance of knowledge as a source of sustainable competitive advantage and protection of knowledge created by an organization has become critical. Intellectual Property Rights (IPR) is a crucial asset to business today. It provides huge business opportunities but is also facing problems of piracy. Indian government has amended the law to include both product and process patent. India is increasingly being recognized as global innovation hub, particularly in software industry. This paper also presents the empirical findings on the

attitude of Indian software companies towards IPRs and the level of awareness of IPRs in the Indian industry in general.

Ignacio De Leon (2001) explores the limitations of the current patent system regulating inventions, saying that such regulation is bound to create legal monopolies and entry barriers to potential competitors. Thus, the paper explains why the law should adopt a different pro-competitive approach towards the assignment of these IP rights. The paper talks about the how flaws on the regulatory system created by patents, results in a misunderstanding of the role they play in promoting entrepreneurship. Hence, there is a possibility among scholars to confuse the core protected by patents (entrepreneurial inventiveness) with an alleged natural right to "intangible property". This confusion leads regulators to grant extensive legal monopolies and therefore denies potential competitors to use the ideas protected by patents, in their own innovation process. The author argues that IP rights instead of protecting entrepreneurship, tends to stifle competition and innovation. The author suggests that regulators should consider their knowledge limitations to devise optimal legal monopolies like patents. The entrepreneurs should be left to decide when and how they should make "public" the ideas embedded in their invention.

Catherine Fisk (2001) in her paper highlights how the invention of trade secret doctrine in the mid-nineteenth century enabled employers to prevent sharing of secret information by current or former employees. At the same time, courts enlarged the permissible uses of post-employment covenants of non-competence. These developments defined the bounds of permissible entrepreneurship. This paper also examines the origins and development of the law of trade secrets and restrictive covenants through study of cases and treatises and also through the study of corporate practices. Citing extensively from

Du Pont company study, this paper examines how a firm that was unusually aware of the value of employee intellectual property, used the law to achieve its goal of protecting its own secrets while learning new developments from others.

James Hayton (2005) in his paper argues that intellectual capital (IC) offers a potential source of sustainable competitive advantage resulting in technological development and economic growth. This study proposes a three-dimensional framework for describing and measuring a firm's IC that includes human capital, intellectual property, and reputational capital. Drawing upon the resource-based view of the firm, the author argues that in high-technology new ventures (HTNVs), intellectual capital assets offer a unique source of advantage that facilitates entrepreneurship by reducing the risk and increasing the returns from investments in innovation and venturing. This paper reports the results of an empirical study of 237 HTNVs in the US that issued an initial public offering between 1994 and 1998. The findings reiterate the fact that these firms' top management team human capital diversity and organizational reputation were of greatest significance for their entrepreneurial performance.

David Audretsch, T. Taylor Aldridge & Alexander Oetti (2006) in their study examine the commercialization of research by the top twenty percent of university scientists funded by grants from the National Cancer Institute (NCI). Since the two publicly available modes of scientist commercialization - patents and Small Business Innovation Research (SBIR) grants - do not cover the full spectrum of commercializing activities undertaken by university scientists, the study also includes two additional measures obtained from detailed scientist interviews: “licensing of intellectual property and starting a new firm”. These measures are used to assess the scientist’s commercialization of research. In particular, two distinct methods for commercializing scientist research are identified, the

Technology Transfer Office (TTO) route and the entrepreneurial route, which does not involve assigning a patent to the University.

Stuart Graham, Robert Merges, Pamela Samuelson & Ted Sichelman (2009) offer an analysis of the 2008 Berkeley Patent Survey, summarizing the responses of 1,332 U.S.-based technology startups in the biotechnology, medical device, IT hardware, software, and Internet sectors. The survey revealed that holding patents is more widespread among technology startups than has been previously reported, but the patterns and drivers of holding patents are industry and context specific. Startup executives reported that patents were providing relatively weak incentives for core activities in the innovation process. The survey analysis uncovers that the drivers of startup patenting are often associated with capturing competitive advantage, and the associated goals of preventing technology copying, securing financing, and enhancing reputation. Interestingly, venture-backed IT hardware startups tend to resemble those in health-related fields in terms of their use of and motives for patenting. The study also finds a wide disparity between the patenting behavior of venture-backed technology startups and those that are not funded with venture capital.

Jon Garon (2009) in his paper focuses on the legal and business attributes of exclusivity and relevance to educate entrepreneurs in building market share and maximizing profitability. The study also focuses on how to identify the opportunities for changes in processes and markets. It compares the market relevance of a patented medicine for a medical patient and the “social relevance” of a Barbie Doll for a child. Because the relationship between the entrepreneur and investor is critical to success, the paper also explores financing options and suggests how to align the interests of investors and employees with those of the entrepreneurs.

(Please note that literature review mentioned above is a summary of the research areas, the findings of the study, the limitations & future research potential. The literature review is still in progress. Once the author goes through substantially more literature, the final review will be presented as per established research guidelines)

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